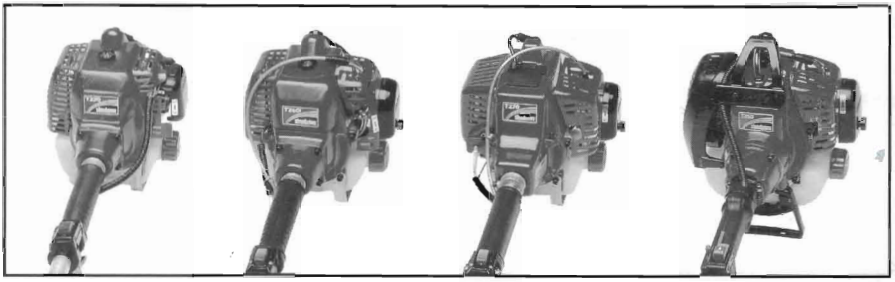
NUMBER 7

COMPARISON GUIDE

SHINDAIWA STRAIGHT SHAFT TRIMMERS AND BRUSHCUTTERS VS THE COMPETITION



Shindaiwa 230, 260, 270, 350 Series
vs
Echo, Stihl, Husqvarna

shindaiwa

WHY BUY A SHINDAIWA TRIMMER/BRUSHCUTTER?

The ultimate commercial trimmer/brushcutter would be ruggedly built, yet light in weight; powerful as well as dependable; and very comfortable in all-day use. In other words, it would be exactly like a Shindaiwa T230, T260, T270, or T350.

Shindaiwa is known around the world as a leader in the design and manufacture of pro-quality, power landscaping tools. This reputation is based on Shindaiwa's tradition of developing products rated highest in horsepower, lightest in weight.

They're sturdy too. Our high quality components and exceptionally close control of manufacturing tolerances yield products that are incredibly durable. Shindaiwa equipment is renowned for giving peak performance, day after day, in tough commercial applications.

Shindaiwa performance and durability are the result of time-tested technical traditions combined with modern engineering principles and state-of-the-art construction materials.

Our workhorse two-stroke trimmer/brushcutter engines are Pro-Tuned to deliver maximum torque at mid-range operating speeds. This gives our equipment an edge in performance because the mid-range is where trimmers/brushcutters operate most of the time.

All Shindaiwa trimmers/brushcutters are engineered for extended, trouble-free performance. Yet, should service become necessary, they are designed for simple, cost-effective repair.

Furthermore, Shindaiwa products are sold exclusively through qualified, servicing, power equipment dealers. This means the parts and know-how are always there to keep your Shindaiwa trimmer/brushcutter running like new.

The competition may think it's in the same league as Shindaiwa, but a careful analysis tells a different story. This booklet offers a detailed comparison of Shindaiwa Models T230, T260, T270, T350, and their closest competitors: Echo SRM-2400, SRM-3100S, SRM-3400; Husqvarna 225L, 232L, 235R; and Stihl FS-76, FS-88, FS-108.

Consider the evidence and see if you don't agree: Shindaiwa trimmers/brushcutters deliver the best performance, durability and value.

NOTE: This comparison was based on models available in the U.S.A. at the time of printing. Models, descriptions, and specifications may vary in other countries. All specifications subject to change without notice.

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WHY SHINDAIWA ENGINES ARE MORE POWERFUL:

"How does Shindaiwa get so much more power from engines that are often smaller than the competition?"

"Why do Shindaiwa engines last so long?"

Good questions—We hear them quite often.

And it's true; Shindaiwa packs a lot of muscle in some pretty small packages. And, they do seem to last forever.

The Relationship Between Displacement And Power . . .

There really isn't one. There's no hard-and-fast rule that says the bigger the displacement, the greater the power. A two-stroke engine of given displacement can produce a wide range of power outputs simply by varying:

- Compression Ratio
- Port Size, Shape and Timing
- Carburetion
- Exhaust/Muffler

Some equipment manufacturers use low-cost components and construction methods to achieve a lower price. To offset resulting losses in performance, they simply increase engine displacement.

They trade weight for power.

One way to measure this tradeoff is by the "power/weight ratio," a comparison of the engine weight to its output in horsepower.

Obviously, trimmer operators want high power and low weight.

Another measure is "specific output," which is the ratio of the engine's power output to its displacement. Operators want high horsepower-to-displacement (hp/cc) values—numbers associated with higher tuned engines.

What About Durability?

Since de-tuned engines use components made of low cost materials, they simply can't hold up to the demands of professional users.

They trade durability for price.

You measure durability by how long the engine lasts and how many hours of service it delivers between overhauls.

Those numbers are a little tougher to quantify because operating conditions vary so widely. However, our experience tells us that high-performance engines—the ones with high power/weight ratios and high specific outputs—are the ones that last longer (provided they are built with top quality components).

When You Check Out The Numbers . . .

Shindaiwa engines destroy the competition with unrivaled power/weight and specific output ratios. We set the standard for two-stroke performance through uncompromising engineering, incredibly tight manufacturing tolerances, and use of the finest materials available.

In the long haul, Shindaiwa trimmer/brushcutters offer the best value.

PERFORMANCE COMPARISON

When considered separately, factors such as cutting swath, engine displacement and horsepower offer little help in comparing trimmer/brushcutter performance.

The best way to make an apples-to-apples comparison is to put the most relevant factors—horsepower, weight, and displacement—into ratios.

The power-to-weight ratio shows the amount of horsepower generated per pound of weight. Machines with higher ratios are the ones most powerful for their weight. They get the job done faster and with greater comfort since they deliver the highest power per pound.

Specific output shows the relationship between an engine's power rating and its displacement. The higher the figure, the more power per cc. A high ratio identifies an engine that is engineered and tuned for peak performance. In general, high performance engines are better made and more apt to endure in tough, extended use. This is especially true of Shindaiwa engines because they are well made, *and* they incorporate the highest quality materials.

The adjacent table shows displacement, horsepower and weight of 14 popular commercial trimmer/brushcutter models. Respective power-to-weight and specific output ratios are illustrated in the graphs on page 5.

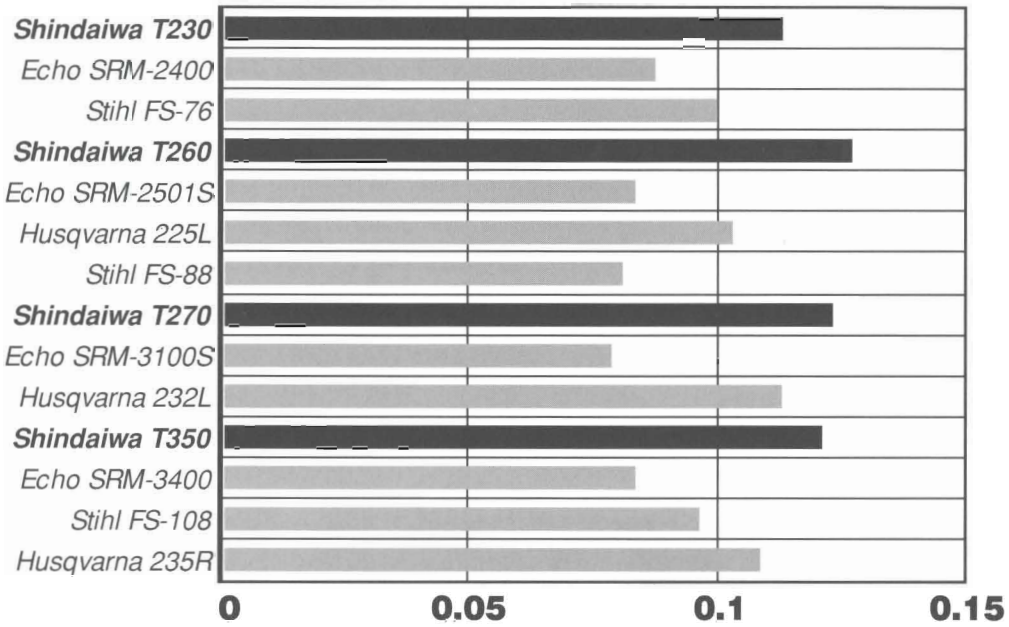
As these graphs reveal, Shindaiwa products lead each displacement class in power-to-weight and specific output.

MODEL	CC	HP	LBS.
Shindaiwa T230	22.5	1.10	9.7
Echo SRM-2400	23.6	1.05	12.0
Stihl FS-76	23.9	1.10	11.0
Shindaiwa T260	24.1	1.40	11.0
Echo SRM-2501S	24.4	1.10	13.5
Husqvarna 225L	25.0	1.20	11.7
Stihl FS-88	25.4	1.20	15.0
Shindaiwa T270	27.2	1.50	12.3
Echo SRM-3100S	30.5	1.20	15.0
Husqvarna 232L	30.8	1.47	12.8
Shindaiwa T350	33.6	1.80	14.9
Echo SRM-3400	34.0	1.35	15.9
Stihl FS-108	34.4	1.50	15.6
Husqvarna 235R	36.3	1.70	15.6

(The information in this table was derived from manufacturers' sales literature, trade publications, and test data published by government agencies. While these figures were as accurate as possible at the time of publication, they are subject to change without notice.)

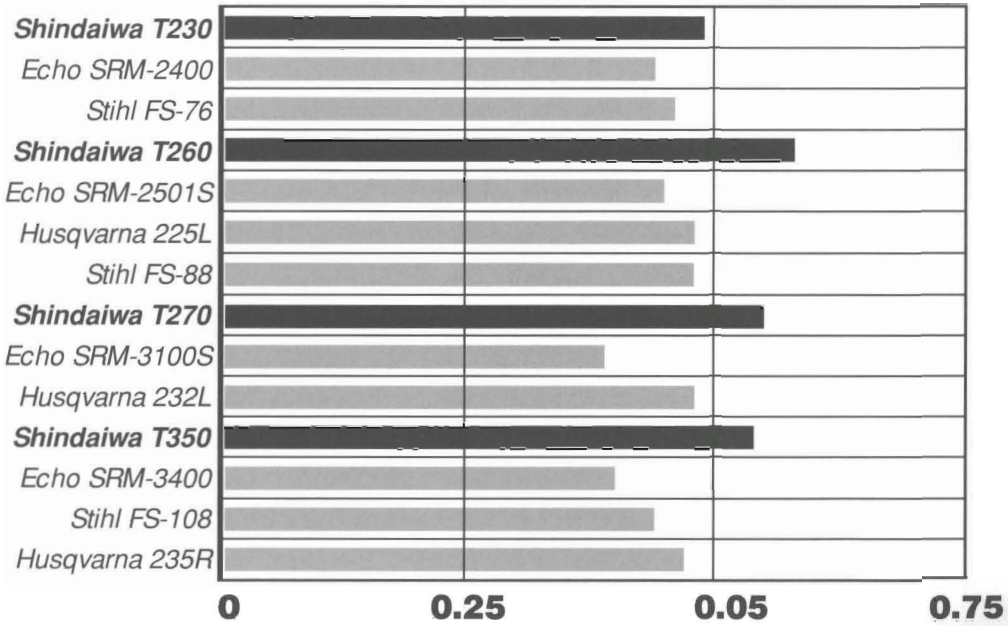
POWER-TO-WEIGHT RATIO

(Horsepower per Pound)



SPECIFIC OUTPUT

(Horsepower per cc)



CARBURETORS

Vital Concerns:

■ Is the carburetor capable of super-precise fuel and air metering for smooth performance and control at any throttle setting?

■ Is the carburetor isolated from cylinder heat by a thick, insulator block?

■ Does the carburetor have an on-board or in-line primer pump for easy starting?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All but the T230 employ TK DP-series slide valve carburetors. The T230 has a Walbro WYL rotary valve carburetor.

All Shindaiwa intake systems are primer-equipped.

Carburetors isolated by a 27 mm thick insulator block (except T230: 25 mm).

Echo SRM-2400 / SRM-3100S / SRM-3400

All use butterfly-type carburetors with primer pumps.

All are isolated by a 22 mm insulator block.

Husqvarna 225L / 232L / 235R

All use butterfly-type carburetors with no primer pump.

All are isolated by a thin, rubber boot that slips onto the cylinder intake port (no clamp).

Stihl FS-76 / FS-88 / FS-108

All use butterfly-type carburetors. None have primer pumps (except FS-76).

All are isolated by a 23 mm insulator block.

Analysis:

Only Shindaiwa uses slide-valve and rotary-valve carburetors for optimum performance at any throttle setting. They are ideal for trimmer/brushcutter engines because their air/fuel metering is so precisely controlled. This means better performance, especially at mid-range RPM, where trimmer/brushcutters most often run.

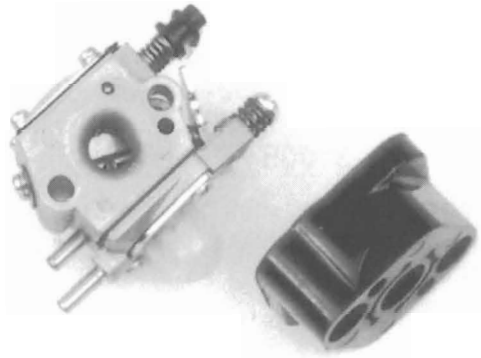
Less expensive, standard butterfly-type carburetors are not as well suited to mid-range applications. They are more appropriate on chain saws and other products used primarily at wide-open-throttle. Butterfly-type carburetors are not used on Shindaiwa-built trimmers and brushcutters.

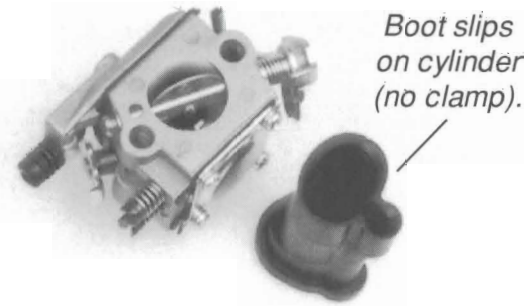
Only Shindaiwa and Echo models are 100% primer-equipped. Primers purge air from carburetor passageways to expedite starting.

Shindaiwa uses the thickest insulator blocks to assure minimal heat transfer and risk of vapor-lock.

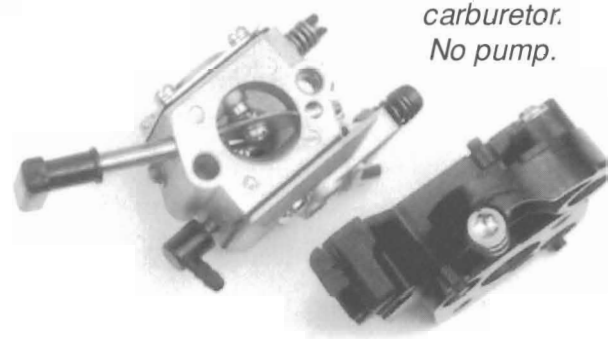
HUSQVARNA 232L
Butterfly-type carburetor. No primer pump.

ECHO SRM-3100S
Butterfly-type carburetor with primer pump.

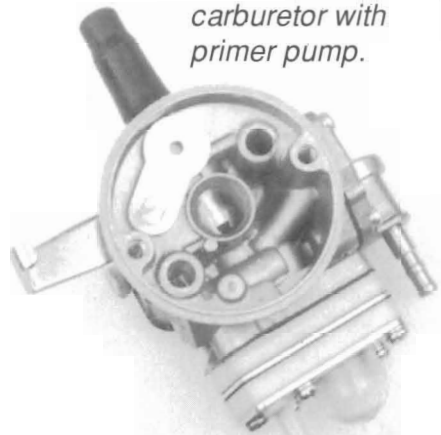




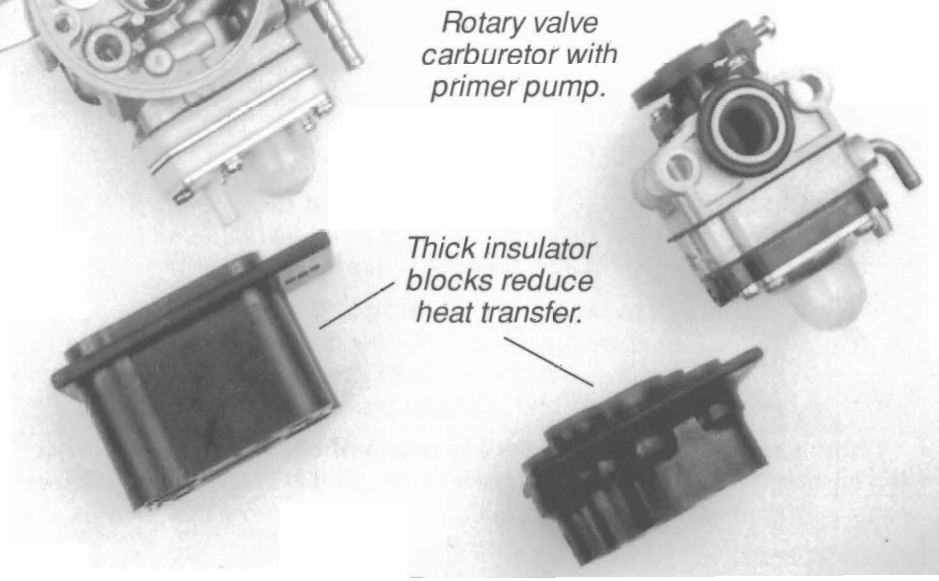
STIHL FS-88 *Butterfly-type carburetor. No pump.*



SHINDAIWA T270
Slide valve carburetor with primer pump.



SHINDAIWA T230
Rotary valve carburetor with primer pump.



FUEL TANKS AND MOUNTINGS

Vital Concerns:

- Is the tank mounted via cushions to prevent breakage and reduce vibration-induced fuel aeration?
- Is the tank large enough to sustain extended work sessions?
- Does the filler neck have a large and unobstructed opening for easy refueling?
- Is the tank made of see-through plastic for easy fuel checking and filling without spills?
- Is the tank vent remote to reduce the mess and trouble associated with cap vents?
- Is the cap gasket made of swell-resistant cork?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All Shindaiwa fuel tanks are mounted via rubber cushions, or straps, and have remote vents and cork cap gaskets.

Tank capacity (oz.)/filler opening (mm): **T230**—17.6/29; **T260**—20.3/29; **T270**—21.0/29; **T350**—34.0/30.

Echo SRM-2400 / SRM-3100S / SRM-3400

SRM-2400 has bolt-on tank and cap vent; others are cushion-mounted with remote vents. All cap gaskets made of rubber compound.

Tank capacity (oz.)/filler opening (mm): **SRM-2400**—14.2/27; **SRM-3100S**—27.1/28; **SRM-3400**—27.1/28.

Husqvarna 225L / 232L / 235R

Fuel tanks are part of engine housing; no anti-vibration. All have vented caps with rubber compound gaskets.

Tank capacity (oz.)/filler opening (mm): **225L**—20.8/27; **232L**—20.8/27; **235R**—20.8/27.

Stihl FS-76 / FS-88 / FS-108

Some models have bolt-on tanks (FS-88 and FS-108), while others (FS-76) are cushion-mounted. All have vented caps with rubber compound gaskets.

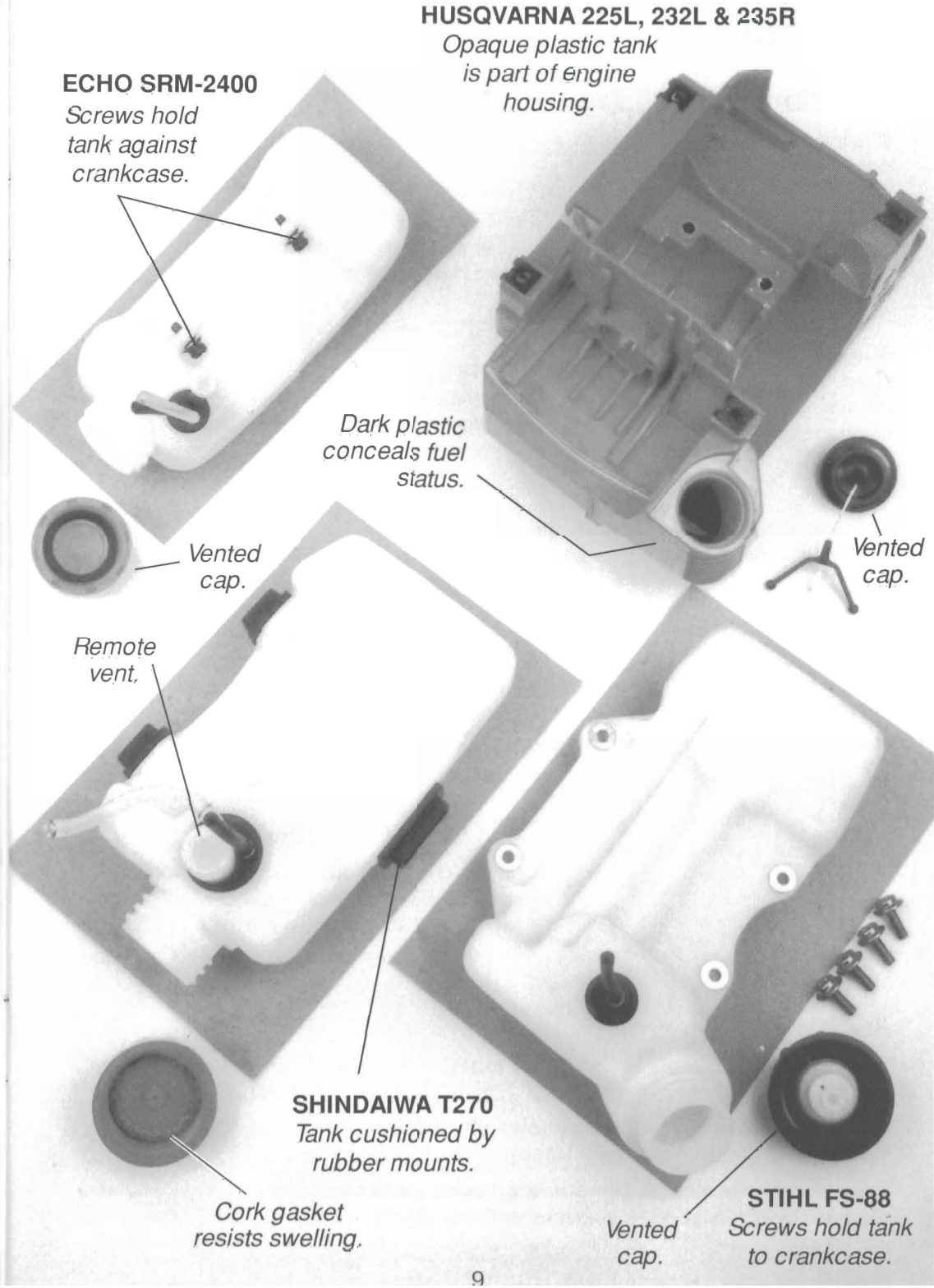
Tank capacity (oz.)/filler opening (mm): **FS-76**—13.8/27; **FS-88**—23.2/29; **FS-108**—23.2/28.

Analysis:

Only Shindaiwa has 100% cushion-mounted tanks, which are less apt to crack or break than bolt-on designs. Cushioned mounts reduce vibration-generated bubbles that, when ingested, can cause lean running and possible engine damage.

Shindaiwa tanks are larger than average, for extended running, and easy to fill, thanks their well-exposed, large-diameter filler necks. Husqvarna's dark plastic tanks hide fuel status and are harder to fill without spills. Vapors from spilled fuel are a significant emissions source and cause for environmental concern.

Shindaiwa's fuel cap gaskets are made of cork, which is less apt to swell and stick shut compared to other gasket materials. All Shindaiwa tanks have remote vents, so their caps are void of vents that ooze fuel or plug with debris.



MUFFLERS

Vital Concerns:

- Is the muffler a sturdy one-piece assembly for optimum integrity and serviceability?
- Are the muffler mounting bolts easy to access?
- Does the spark arrestor screen have external access for easy field maintenance?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All models have one-piece mufflers, held fast via two external mounting screws and a brace screw (all Allen).

Tubular spark arrestor screen, which slides into outlet tube, is secured by a single Phillips screw.

Echo SRM-2400 / SRM-3100S / SRM-3400

SRM-2400 has 13-piece muffler with two internal mounting screws (Allen) and a brace screw (Phillips/slot combo). Other models have one-piece muffler with external mounting screws and a brace screw (all Allen).

All models have internal spark arrestor screen. Must remove muffler cover (SRM-2400) or cover plate (SRM-3100S/SRM-3400) to access. This involves four combo screws. SRM-3100S and SRM-3400 use two additional screws to secure screen.

Husqvarna 225L / 232L / 235R

All models have an eight-piece muffler with two external Allen mounting screws and no bracing.

Spark arrestor screen is external, but muffler mounting screws and outlet cover must be loosened to service.

Stihl FS-76 / FS-88 / FS-108

All models have a one-piece outer shell plus seven (FS-76) or eight (FS-88/FS-108) other parts. Mounting involves two internal screws and a brace screw (all Torx).

Internal spark arrestor screen is housed under cover plate (four Torx screws).

Analysis:

Shindaiwa's one-piece muffler is much simpler and easier to service than the competition's complex, multi-piece systems, and less likely to vibrate loose.

Tapered Shindaiwa muffler allows shorter-than-average external mounting screws, which are less apt to work loose.

For top performance, the spark arrestor must be clean. Yet only Shindaiwa provides for fast, easy spark arrestor maintenance.

HUSQVARNA 225L
Multi-piece muffler with external spark screen.

ECHO SRM-2400
Multi-piece muffler.

Internal mounting screws.

Internal spark screen.

STIHL FS-76
One-piece body plus other parts.

Internal mounting screws.

SHINDAIWA T260
One-piece muffler.

Internal spark screen.

Easy-access external spark screen.

DRIVE CLUTCHES

Vital Concerns:

- Do clutch shoes have a broad surface area for positive engagement and long wear?
- Is the clutch body made from heat and wear-resistant powdered metal?
- Is the clutch mounted to the flywheel for better crankshaft security and ease of service? Or, is it attached to the end of the crankshaft?
- Are clutch parts scaled to match the loads applied by different displacement engines?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All but the T350 have two-shoe, single spring clutches with bonded surface and 1,692 sq. mm average contact area. T350 sports heavy-duty four-shoe clutch (1,760 sq. mm) with hookless compression springs.

All are flywheel-mounted and made of powdered metal.

Echo SRM-2400 / SRM-3100S / SRM-3400

SRM-2400 has two-shoe, two-spring clutch. SRM-3100S and SRM-3400 have two-shoe, one-spring type. Average contact area is 1,780 sq. mm.

SRM-2400 mounts to crankshaft, others to flywheel. All have cast zinc alloy bodies and bonded shoes.

Husqvarna 225L / 232L / 235R

225L and 232L have two-shoe, two-spring, clutches. 235R has three-shoe, single loop spring design. Average contact area is 1,464 sq. mm. Shoes are not bonded.

All have powdered metal bodies and mount to crankshaft.

Stihl FS-76 / FS-88 / FS-108

FS-76 and FS-88 have two-shoe, two-spring clutches. FS-108 is two-shoe, one-spring type. All have bonded shoes with 1,513 sq. mm average contact area.

FS-76 mounts to crankshaft, others to flywheel. All made of cast zinc alloy.

Analysis:

All Shindaiwa clutches are made of powdered metal, a material that can withstand the high, friction-caused heat, and wear applied by extension spring hooks.

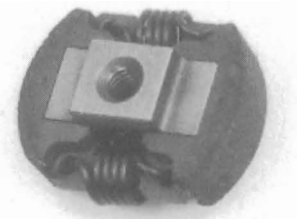
Shindaiwa clutch shoes are among the most ample in surface area, assuring smooth, positive engagement and long life.

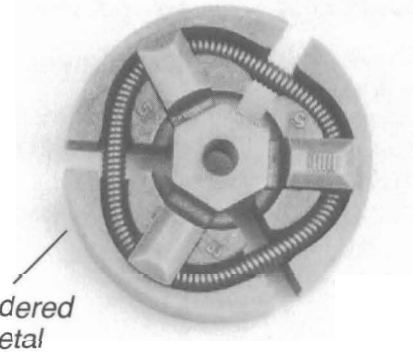
To avoid spring wear altogether, Shindaiwa's T350 clutch is fitted with hookless compression springs—a better idea for big engines and heavy-duty usage.

Unlike the competition, every Shindaiwa model has a flywheel-mounted clutch for easier service and better engine security than the crankshaft-mounted type.

HUSQVARNA 235R
Three-shoe, loop-spring clutch threads onto crankshaft.

STIHL FS-76
Two-shoe, two-spring clutch threads onto crankshaft.

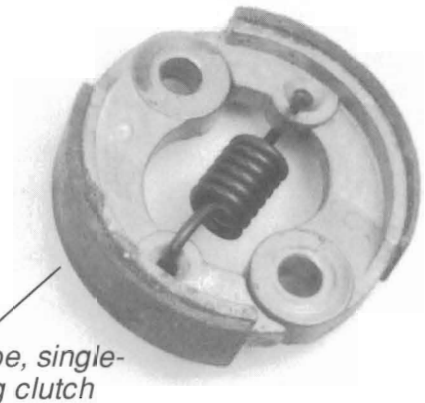




Powdered metal body.

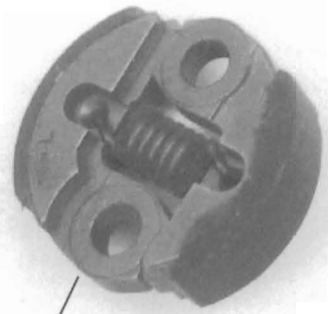
ECHO SRM-2400
Two-shoe, two-spring clutch threads onto crankshaft.

ECHO SRM-3400



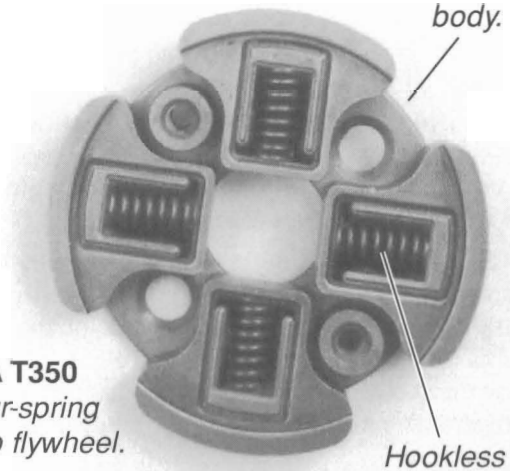
Two-shoe, single-spring clutch mounts to flywheel.

SHINDAIWA T230
Two-shoe, single-spring clutch mounts to flywheel.



Powdered metal body.

Powdered metal body.



SHINDAIWA T350
Four-shoe, four-spring clutch mounts to flywheel.

Hookless compression springs.

FLYWHEELS

Vital Concerns:

■ Does the flywheel bore have a close-tolerance, precision diecast bore and well-defined key slot? This assures a tight interlock of flywheel, Woodruff key and crankshaft.

■ Does the bore have an extended taper for maximum crankshaft contact area?

■ Is the flywheel tuned to the specific engine application, or is it a one-size-fits-all installation?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All Shindaiwa flywheels have close-tolerance, precision diecast bores and deep, sharp key slots.

Each flywheel is unique, designed specifically for the engine it fits.

T350 flywheel has a cast-in steel insert and milled key slot.

Echo SRM-2400 / SRM-3100S / SRM-3400

SRM-2400 flywheel has cast-in key

SRM-3100S and SRM-3400 have a cast-in key slot. The same flywheel is used in both engines.

Husqvarna 225L / 232L / 235R

All models have a cast-in key.

The same flywheel is used in all three engines.

Stihl FS-76 / FS-88 / FS-108

All models have a cast-in key slot.

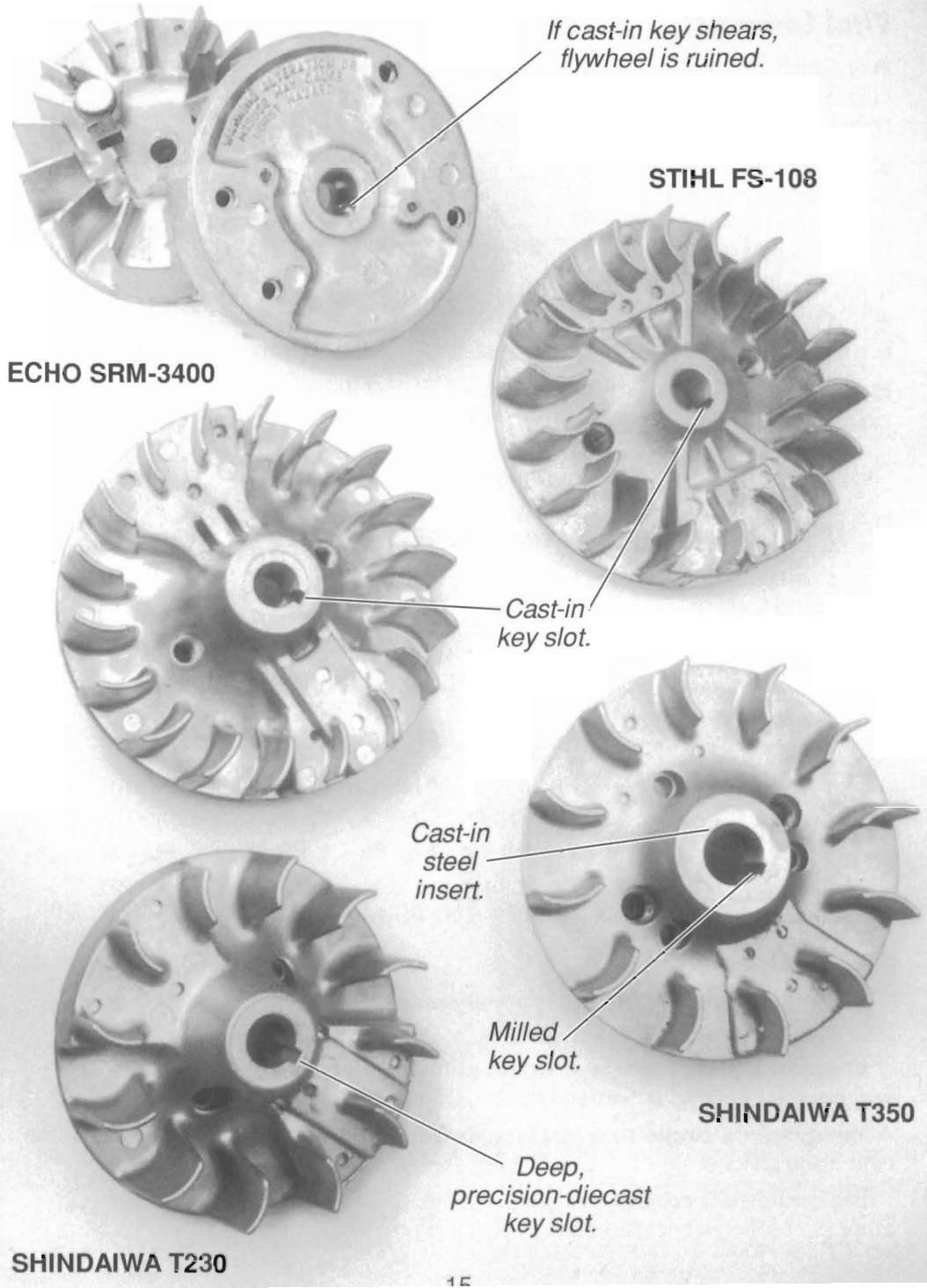
Analysis:

Shindaiwa flywheels have close-tolerance, precision diecast bores and deep, sharp, key slots for absolute mounting security. Some competing flywheels lack this depth and definition, which are vital for aligning the flywheel and locking it to the crankshaft, long-term.

Flywheels with cast-in keys, such as those used by Husqvarna and Echo (SRM-2400), save production steps, but lack the firm fit of a precision key slot and Woodruff key. Also, if a cast-in key is sheared or damaged, the entire flywheel must be replaced—an expensive proposition.

Shindaiwa flywheels are specifically engineered for each engine. For example, the big displacement, T350's flywheel bore is reinforced with a cast-in steel insert and milled key slot. Husqvarna, on the other hand, uses the same flywheel in all three models, despite an 11 cc spread in displacement. This one-size-fits-all philosophy may be cost-effective, but it's contrary to Shindaiwa's goal of gleaning maximum power and minimum weight from every engine.

HUSQVARNA 225L, 232L & 235R
Same flywheel used on all models.



CRANKSHAFTS/RODS/PISTONS

Vital Concerns:

- Are crankshaft and connecting rod both heavy-duty forgings?
- Do piston pin and crank pin have large diameters for better load-bearing capabilities?
- Are needle bearings caged for minimal friction and maximum life?
- Is thrust controlled at the rod's small end to ensure maximum big-end lubrication?
- Is the piston fitted with two compression rings to assure optimum sealing and support within the cylinder?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All have small-end thrust control and two-ring pistons.

Crankshaft weight (oz.): **T230**—7.0; **T260**—8.8; **T270**—9.0; **T350**—10.8.

Piston pin/crank pin diameters (mm): **T230**—8/10; **T260**—9/10; **T270**—9/12; **T350**—10/13.

Echo SRM-2400 / SRM-3100S / SRM-3400

All have small-end thrust control and two-ring pistons.

Crankshaft (oz.): **SRM-2400**—7.7; **SRM-3100S**—9.0; **SRM-3400**—9.0.

Piston pin/crank pin diameters (mm): **SRM-2400**—8/10; **SRM-3100S**—9/12; **SRM-3400**—9/12.

Husqvarna 225L / 232L / 235R

All have small end thrust control and one-ring pistons.

Crankshaft (oz.): **225L**—7.3; **232L**—11.9; **235R**—11.9.

Piston pin/crank pin diameters (mm): **225L**—8/10; **232L**—10/12; **235R**—10/12.

Stihl FS-76 / FS-88 / FS-108

FS-76 and FS-108 have small-end thrust control. FS-88 has big-end thrust control. All have two-ring pistons.

Crankshaft (oz.): **FS-76**—7.1; **FS-88**—8.3; **FS-108**—10.6.

Piston pin/crank pin diameters (mm): **FS-76**—8/10; **FS-88**—8/10; **FS-108**—10/12.

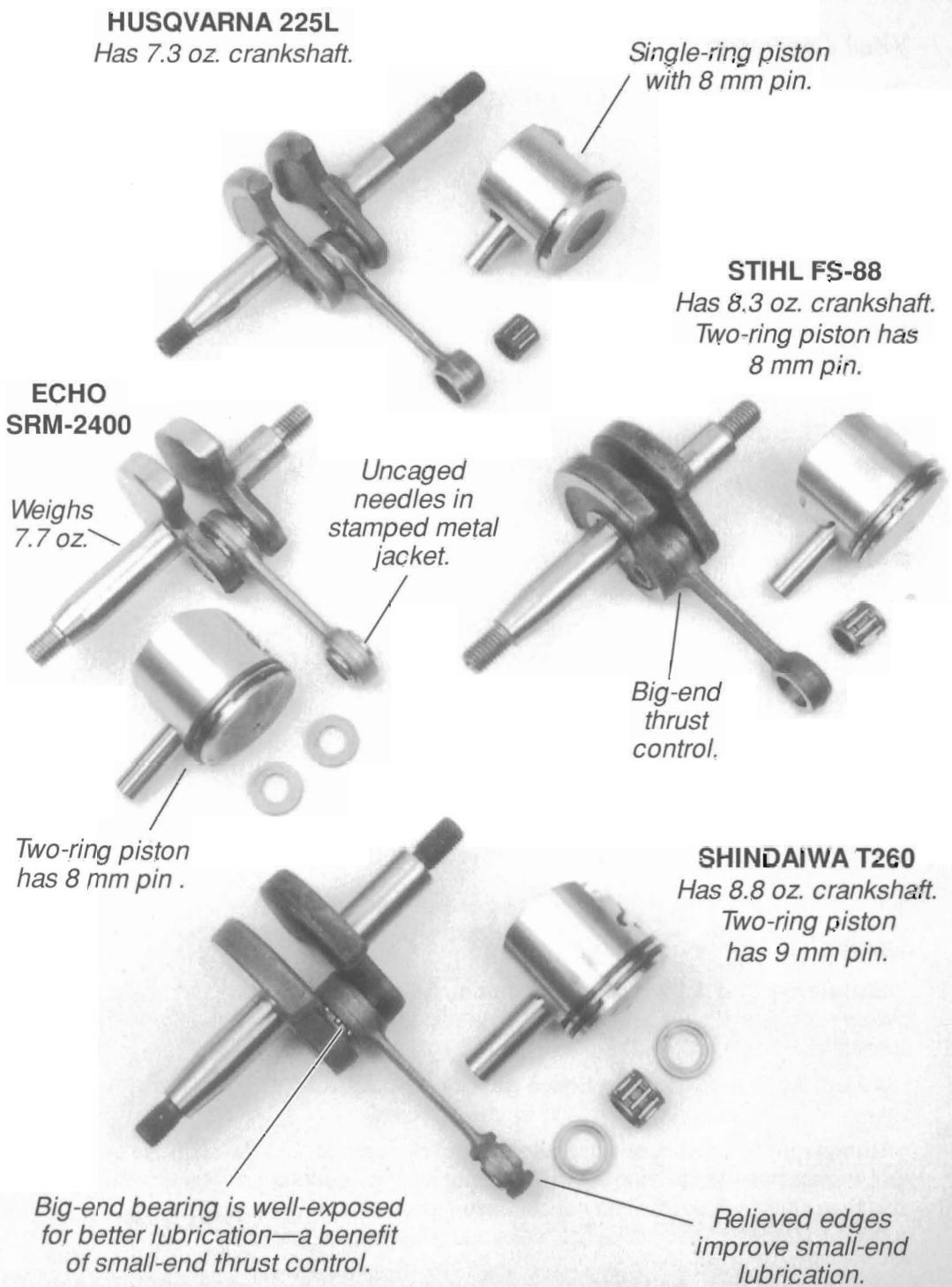
Analysis:

Shindaiwa crankshafts are typically more substantial than their competition, and thus, more durable.

Shindaiwa piston pins and crank pins have larger-than-average diameters, which spread the load and extend bearing life. All utilize caged needle bearings.

Husqvarna's single-ring pistons have half the support and sealing surfaces of two-ring pistons.

Big-end thrust control systems, like that used on the Stihl FS-88, can retard crank pin bearing lubrication—critical at maximum RPM under severe conditions.



CRANKCASES

Vital Concerns:

- Are crankcase halves precision-made castings, so uniform that they may be purchased separately?
- Have crankcase mating surfaces been machined to assure flawless contact and a lasting airtight seal?
- Are the case halves sealed with a strong, pliable, high-temperature liquid gasket compound?
- Are crankcase halves made of like materials, for best structural integrity and uniform thermal expansion/contraction?
- Are crankcase bearings a snug, press-fit installation to assure they don't slip or spin in their bores?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All have aluminum alloy crankcase halves with machined mating surfaces and press-fit bearings.

Halves are available separately. Sealed via liquid gasket.

Echo SRM-2400 / SRM-3100S / SRM-3400

All have aluminum alloy crankcase halves with press-fit bearings.

Halves *not* available separately. Sealed via paper or synthetic gaskets.

Husqvarna 225L / 232L / 235R

All have horizontally-split crankcase, with aluminum alloy top half, and plastic bottom half. Mating surfaces are not machined. Bearings clamped by the screws that hold crankcase/cylinder assembly together.

Top crankcase half (includes cylinder) and bottom half (includes fuel tank) may be purchased separately. Halves sealed via liquid gasket.

Stihl FS-76 / FS-88 / FS-108

All have aluminum alloy crankcase halves with press-fit bearings.

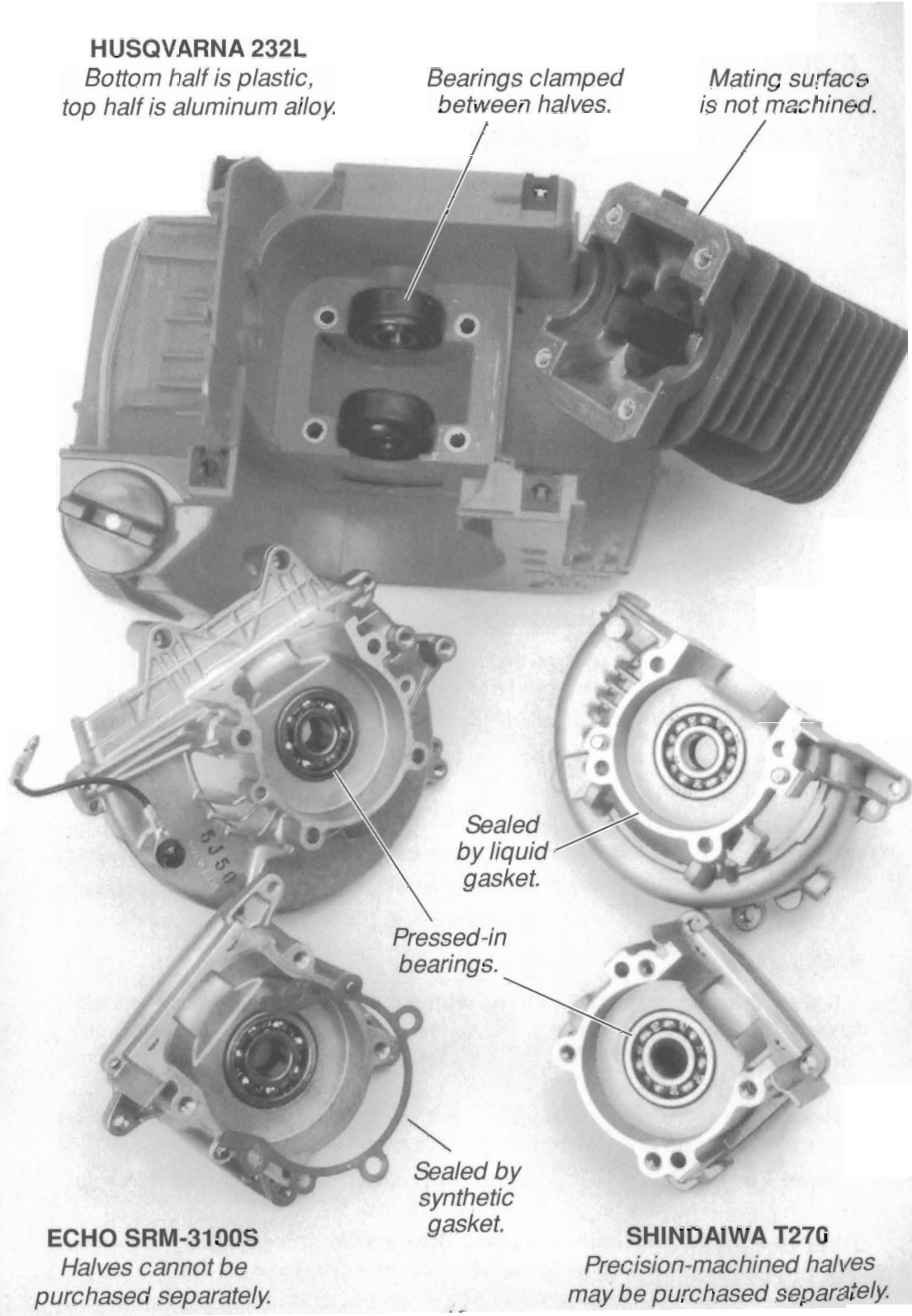
Halves are available separately. Sealed via liquid gasket.

Analysis:

Shindaiwa and Stihl offer economical, individual replacement of alloy crankcase halves. If an Echo crankcase half is damaged, both halves must be replaced, at considerably more expense.

All but Echo use modern liquid gasket compounds to seal the crankcase halves. Echo still relies on paper and synthetic gaskets.

Husqvarna's unconventional design involves crankcase halves made of dissimilar materials—plastic and metal. Effects of high temperature may be less predictable than all-alloy designs. This concern, plus as-cast (non-machined) mating surfaces, suggest greater risk of air leaks and allied engine damage.



ANTI-VIBRATION SYSTEMS

Vital Concerns:

- Are powerhead and outer tube isolated by robust rubber couplers?
- Are shaft and handle grips cushioned?
- Is the mainshaft supported by replaceable rubber-mounted bushings?
- Are mainshaft ends splined to minimize wear and resulting chatter?
- Is the fuel volume isolated by tank mounting cushions?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

Engines and outer tubes isolated by thick rubber buffers.

Splined mainshafts supported by replaceable rubber-mounted bushings.

All have cushioned shaft grips and all but T230 have cushioned loop handles.

Echo SRM-2400 / SRM-3100S / SRM-3400

Engines and outer tubes isolated by thin rubber collars.

SRM-3100S and SRM-3400 have splined shafts and rubber-mounted bushings; SRM-2400 has square-end flex-shaft and plastic liner.

All have cushioned grips on shaft and loop handles.

Husqvarna 225L / 232L / 235R

Engine and outer tube are isolated by an elaborate plastic handle assembly with four pop-in cushions.

Threaded mainshaft rides in rubber-mounted bushings.

All hand grips are hard plastic.

Stihl FS-76 / FS-88 / FS-108

Engines and outer tubes isolated by thick rubber buffers.

Square-end mainshafts ride in rubber-mounted bushings.

All hand grips are hard plastic.

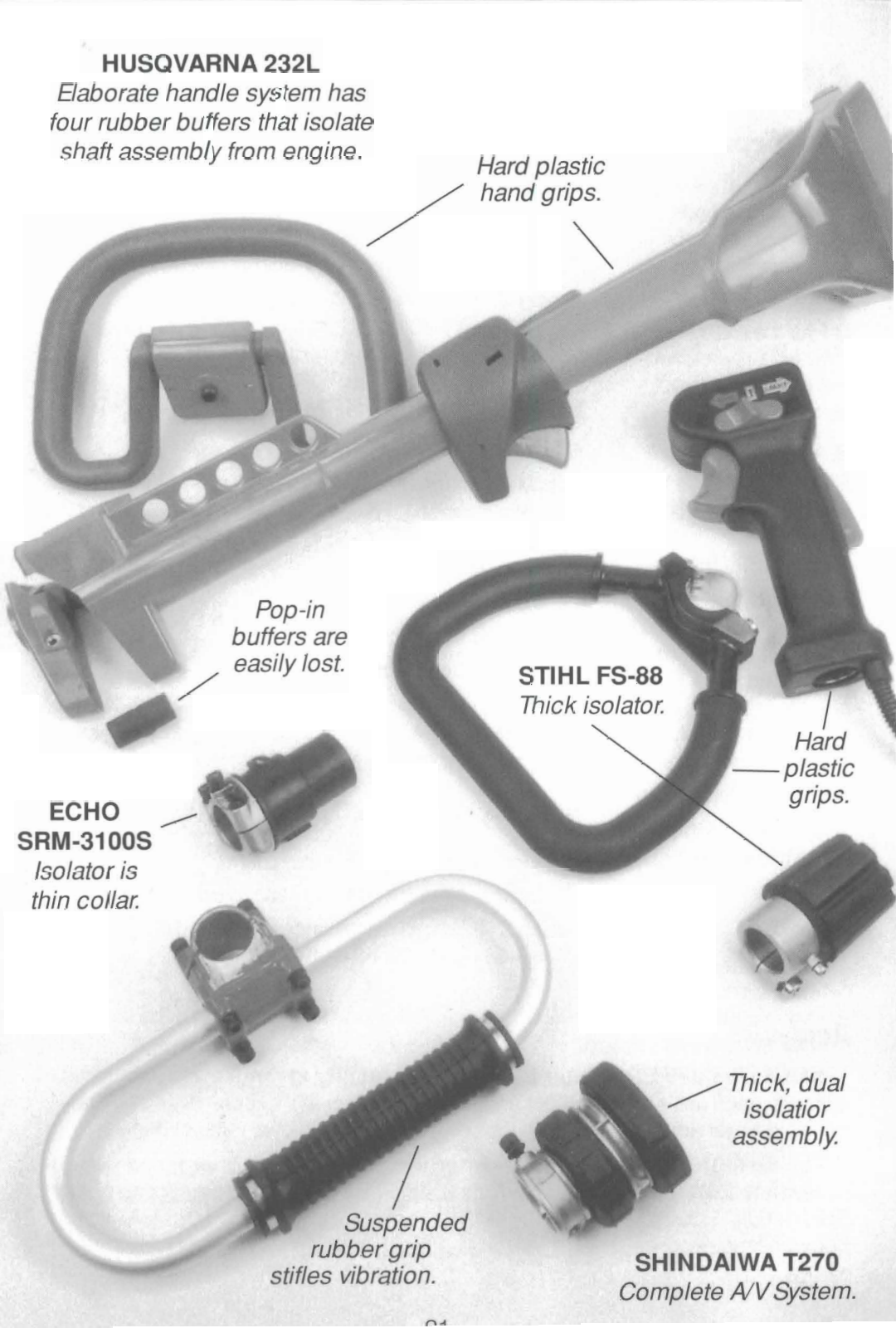
Analysis:

Only Shindaiwa stifles vibrations with a system approach that starts with smooth, precision-tuned engines, and includes large, effective, engine/shaft vibration isolators, 100% splined mainshafts, rubber-mounted mainshaft bushings, soft rubber hand grips, and cushion-mounted fuel tanks.

Husqvarna's elaborate anti-vibration handle system falls short, with hard plastic hand grips and pop-in cushions that are easily lost.

Echo's engine/shaft isolators are thin rubber collars that pale in comparison to the robust anti-vibration buffers used by Shindaiwa and Stihl.

Stihl's hard plastic hand grips lack the comfort accorded by soft-style grips, and their square-end mainshaft connections are more prone to wear and chatter.



OUTER TUBES

Vital Concerns:

- Is the outer tube made from aircraft grade aluminum for light weight and maximum strength?
- Has the tubing been mandrel-drawn to improve its resistance to bending?
- Are tubing diameter and wall thickness suitable for the intended application?
- Has the tubing been satin anodized? Have ends been chamfered? These processes improve aesthetics. Plus, chamfering makes tube and gearcase installation easier, and hastens bushing replacement, if ever necessary.

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All tubes extruded & drawn from aircraft grade aluminum.

All have chamfered ends and satin anodized finish.

Tubing O.D. (mm)/wall thickness (in.): **T230**--24/.060; **T260**--24/.060; **T270**--26/.063; **T350**--26/.063; **C350** (brushcutter version)--28/.078.

Echo SRM-2400 / SRM-3100S / SRM-3400

All tubes made of extruded aluminum.

All have chamfered ends and all except SRM-2400 are satin anodized.

Tubing O.D. (mm)/wall thickness (in.): **SRM-2400**—25/.060; **SRM-3100S**—25/.058; **SRM-3400**—25/.058.

Husqvarna 225L / 232L / 235R

All tubes made of extruded aluminum.

All are flush-cut (no chamfer) and satin anodized.

Tubing O.D. (mm)/wall thickness (in.): **225L**—25/.065; **232L**—25/.072; **235R**—28/.077.

Stihl FS-76 / FS-88 / FS-108

All tubes made of extruded aluminum.

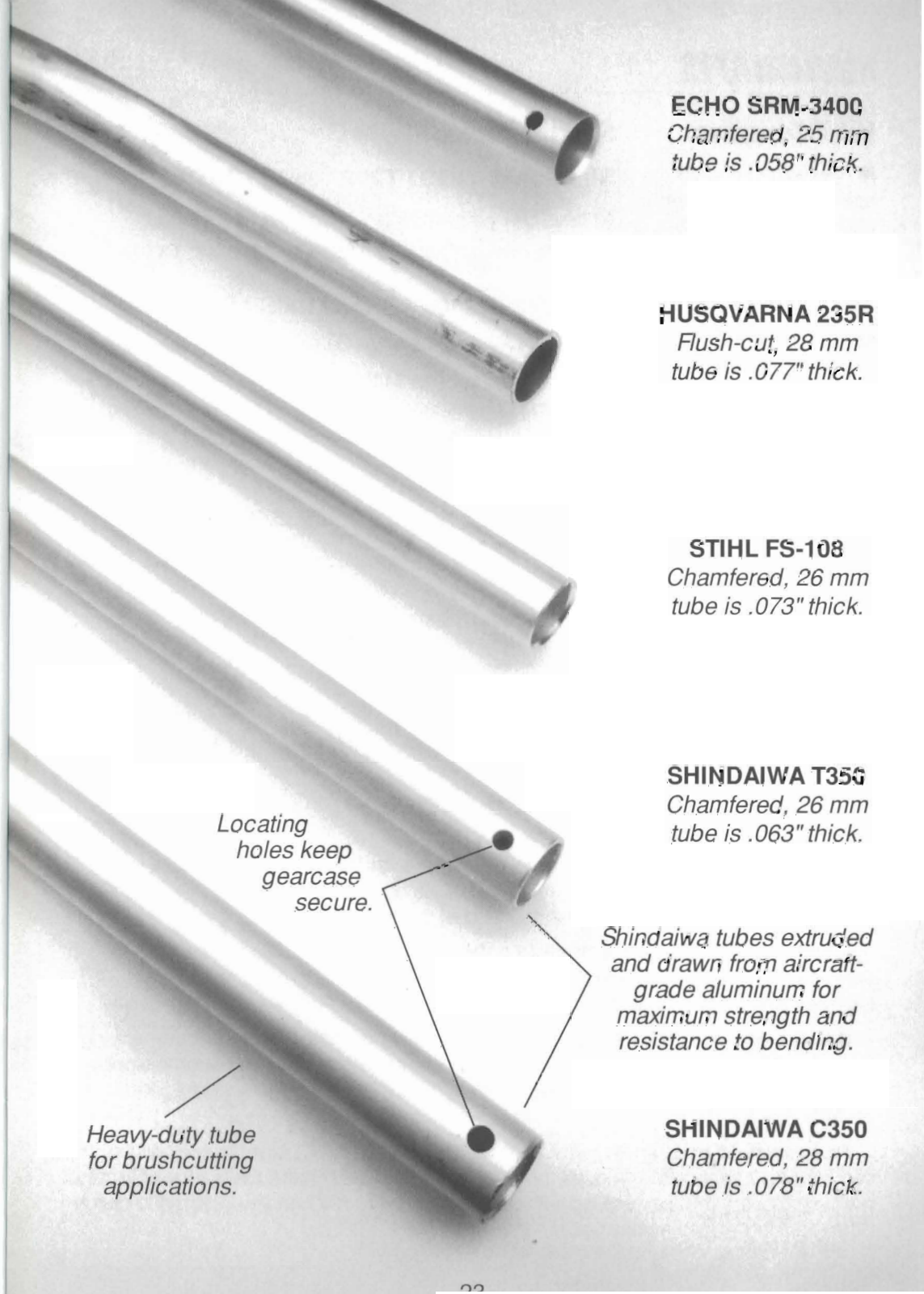
All have chamfered ends and satin anodized finish.

Tubing O.D. (mm)/wall thickness (in.): **FS-76**—24/.060; **FS-88**—24/.060; **FS-108**—26/.073.

Analysis:

Shindaiwa's rugged outer tubes reflect quality styling, and construction suited to each unit's power output and anticipated use. In most cases, Shindaiwa tubing is larger and/or thicker than the competition, and known to be stronger.

For example, the C350 (brushcutter version of T350), is endowed with a heavy-duty, 28 mm diameter, .078-in. thick tube. Compare that to competing models SRM-3400 (25 mm/.058"), 235R (28 mm/.077") and FS-108 (26 mm/.073"). As in most component categories, Shindaiwa quality and engineering savvy are hard to beat.



MAINSHAFTS

Vital Concerns:

■ Are mainshaft ends splined? Splines spread shock loads across a broader surface area, and assure a solid, long-lasting connection.

■ Is the mainshaft made of solid steel and sized appropriately for the application?

■ Is the mainshaft a single piece, without attachments that complicate disassembly?

■ Has the clutch drum-to-mainshaft connection been sufficiently hardened to withstand wear on mainshaft mating surfaces?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

All have one-piece, solid steel, splined mainshafts.

Shaft dia. (mm): **T230**—6, **T260**—7, **T270**—7, **T350**—8.

Echo SRM-2400 / SRM-3100S / SRM-3400

SRM-2400 has a flex-cable mainshaft with squared ends.

SRM-3100S and SRM-3400 have one-piece, solid steel, splined mainshafts.

Shaft dia. (mm): **SRM-2400**—6, **SRM-3100S**—7, **SRM-3400**—8.

Husqvarna 225L / 232L / 235R

All have a two-piece assembly comprising a solid steel shaft and thread-on clutch drum. Lower end is splined.

Shaft dia. (mm): **225L**—7, **232L**—7, **235R**—8.

Stihl FS-76 / FS-88 / FS-108

All have one-piece, solid steel, square-end mainshafts.

Shaft dia. (mm): **FS-76**—7, **FS-88**—7, **FS-108**—8.

Analysis:

All four Shindaiwa models have one-piece, solid steel mainshafts with hardened splines on both ends. Attributes include optimum strength, rock-solid coupling, and easy disassembly from either end of the outer tube.

Echo's SRM-2400 has a flexible cable mainshaft, which lacks the rigid strength and smoothness of a solid steel shaft. The Echo SRM-3100 and Stihl FS-74, less expensive versions of the SRM-3100S and FS-76, also use flexible cable shafts.

Square-end mainshafts, such as those used by Stihl, lack the load-carrying capacity of splined shafts. As corners wear, square-end connections become sloppy, causing an increase in vibration. This problem can be accelerated by clutch drum sockets that are insufficiently hardened.

Husqvarna's mainshaft, with clutch drum attached, prevents easy disassembly. Shaft cannot be removed from gearcase end, and shaft/tubing assembly cannot be removed from powerhead without disassembling A/V handle system and clutch drum housing—quite a nuisance.

ECHO SRM-2400
Flexible, 6 mm cable with squared ends.

HUSQVARNA 225L
Solid, 7 mm steel with threads on engine end, spline on the other.

Thread-on clutch drum prevents easy disassembly of engine and shaft.

STIHL FS-88
Solid, 7 mm steel with squared ends.

A splined connection has much more load-carrying capacity than a square-end connection.

SHINDAIWA T260
Solid, 7 mm steel with hardened splined ends.

SERVICEABILITY

Vital Concerns:

■ Are engine and shaft assemblies easy to disassemble for routine maintenance and service work?

■ Are quality fasteners used throughout?

■ Is the same type of fastener used consistently, to help simplify assembly and reduce the number of service tools required?

Specifications:

Shindaiwa T230 / T260 / T270 / T350

Fasteners predominantly 5 mm Allen socket head.

All models afford easy access to air filter, cooling fins, spark plug, spark arrestor.

Echo SRM-2400 / SRM-3100S / SRM-3400

SRM-2400 has variety of fasteners, including 4 mm and 5 mm socket head, Phillips/slot combo and hex. Difficult cylinder, spark plug and spark arrestor access.

Fasteners on SRM-3100S and SRM-3400 predominantly 5 mm Allen socket head. Must detach entire intake system, muffler cover, and muffler to remove cylinder shroud. Complex spark arrestor access.

Husqvarna 225L / 232L / 235R

Fasteners predominantly 5 mm Allen socket head. Most are self-tapping and anchored in plastic or speed nuts.

Top cover must be removed (four Allen screws) to expose spark plug, cooling fins, and muffler.

Stihl FS-76 / FS-88 / FS-108

Fasteners predominantly 4 mm and 5 mm Torx.

Top cover (two Torx) must be removed to expose cooling fins and muffler. Complex spark arrestor access.

Analysis:

Well-conceived designs and unit construction make Shindaiwa models easy to maintain and repair. Many service jobs can be performed with just one tool: The common, 4 mm Allen wrench. Stihl service requires a less common, #27 Torx driver.

Shindaiwa's smaller models reflect the same design integrity and ease of service found on larger machines—not so with some of the competition.

Husqvarna's large plastic engine housing necessitates use of many self-tapping fasteners and stamped-steel "speed nuts." These fasteners lack the quality perception of machine screws and threaded die castings.

Routine field maintenance is hampered by Husqvarna's expansive engine cover, which shrouds spark plug, cooling fins, muffler, and side access to carburetor. Four Allen fasteners must be removed to gain access.

SHINDAIWA T260

ECHO SRM-2400

Fastener variety includes Allen, Phillips and hex.

Durable, Allen socket head fasteners are predominant.

SPECIFICATIONS*

	SHINDAIWA T230	ECHO SRM-2400
Displacement (cc)	22.5	23.6
Bore/Stroke (mm)	32 x 28	34 x 26
Max. Output (hp)	1.1	1.05
Weight (lbs.)	9.7	12.0
Power-To-Weight Ratio (hp/lbs.)	.113	.088
Specific Output (hp/cc)	.049	.044
Fuel Capacity (oz.)	17.6	14.2
Ignition	1-pc. STCI	1-pc. TCI
Carburetion	Walbro WYL	Zama C1U
Carburetor Type	Rotary Valve	Butterfly
Primer System	Yes	Yes
Fuel Tank Mounting	Cushion	Bolt-on
Clutch Surface / Shoes / Springs	Bonded / 2 / 1	Bonded / 2 / 2
Clutch Shoe Area (sq. mm)	1,696	988
Mainshaft Type/Diameter (mm)	Solid Steel / 6	Cable / 6
Mainshaft Ends	Splined	Squared
Outer tube O.D. (mm) / wall thickness (in.)	24 / .060	25 / .060
Outer Tube Construction	Aluminum	Aluminum
Crankcase Halves Available As:	Separate Parts	Matched Set
Crankcase Sealing Method	Liquid Gasket	Paper Gasket
Piston Type	Two-Ring	Two-Ring
Connecting Rod Bearings	Caged Needle	Torrington-Type
Flywheel Key Slot	Precision-Cast	Cast-In Key

** Specifications derived from manufacturers' sales literature, industry trade publications, and test data published by government agencies. Figures apply to models available in the U.S.A. at the time of printing. Specifications may vary in other countries. All specifications subject to change without notice.*

STIHL FS-76	SHINDAIWA T260	ECHO SRM-2501S*	HUSQVARNA 225L	STIHL FS-88
23.9	24.1	24.4	25.0	25.4
33 x 28	32 x 30	32 x 30	34 x 28	34 x 28
1.10	1.40	1.10	1.20	1.20
11.0	11.0	13.5	11.7	15.0
.100	.127	.082	.103	.080
.046	.058	.045	.048	.047
13.8	20.3	20.3	20.8	23.2
1-pc. TCI	1-pc. TCI	1-pc. TCI	1-pc. TCI	1-pc. TCI
Walbro WT	TK DP-N	Zama C1U	Walbro WT	Walbro WT
Butterfly	Slide	Butterfly	Butterfly	Butterfly
Yes	Yes	Yes	No	No
Cushion	Cushion	Cushion	In Crankcase	Bolt-On
Bonded / 2 / 2	Bonded / 2 / 1	Bonded / 2 / 1	Steel / 2 / 2	Bonded / 2 / 1
962	1,536	1,632	1,380	1,664
Solid / 7	Solid / 7	Solid / 7	2-pc. / 7	Solid / 7
Square	Splined	Splined	Thread/Spline	Square
24 / .060	24 / .060	25 / .060	25 / .065	24 / .060
Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
Separate Parts	Separate Parts	Matched Set	Separate Parts	Separate Parts
Liquid Gasket	Liquid Gasket	Paper Gasket	Liquid Gasket	Liquid Gasket
Two-Ring	Two-Ring	Two-Ring	One-Ring	Two-Ring
Caged Needle	Caged Needle	Caged Needle	Caged Needle	Caged Needle
Cast-In	Precision-Cast	Milled	Cast-In Key	Cast-In

** SRM-2501S is a discontinued model. Included for comparative purposes only.*

SPECIFICATIONS* (continued)

	SHINDAIWA T270	ECHO SRM-3100S
Displacement (cc)	27.2	30.5
Bore/Stroke (mm)	34 x 30	36 x 30
Max. Output (hp)	1.50	1.20
Weight (lbs.)	12.3	15.0
Power-To-Weight Ratio (hp/lbs.)	.122	.080
Specific Output (hp/cc)	.055	.039
Fuel Capacity (oz.) (according to *PET, Dec. '95*)	21.0	27.1
Ignition	1-pc. TCI	1-pc. TCI
Carburetion	TK DP-V	Walbro WT
Carburetor Type	Slide Valve	Butterfly
Primer System	Yes	Yes
Fuel Tank Mounting	Cushion	Cushion
Clutch Surface / Shoes / Springs	Bonded / 2 / 1	Bonded / 2 / 1
Clutch Shoe Area (sq. mm)	1,710	2,336
Mainshaft Type/Diameter (mm)	Solid / 7	Solid / 7
Mainshaft Ends	Splined	Splined
Outer tube O.D. (mm) / wall thickness (in.)	26 / .063	25 / .058
Outer Tube Construction	Aluminum	Aluminum
Crankcase Halves Available As:	Separate Parts	Matched Set
Crankcase Sealing Method	Liquid Gasket	Synthetic Gasket
Piston Type	Two-Ring	Two-Ring
Connecting Rod Bearings	Caged Needle	Caged Needle
Flywheel Key Slot	Precision-Cast	Cast-In

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HUSQVARNA 232L	SHINDAIWA T350	ECHO SRM-3400	STIHL FS-108	HUSQVARNA 235R
30.8	33.6	34.0	34.4	36.3
35 x 32	36 x 33	38 x 30	37 x 32	38 x 32
1.47	1.80	1.35	1.50	1.70
12.8	14.9	15.9	15.6	15.6
.115	.121	.085	.096	.109
.048	.054	.040	.044	.047
20.8	34.0	27.1	23.2	20.8
1-pc. CDI	1-pc. TCI	1-pc. TCI	1-pc. TCI	1-pc. CDI
Walbro WT	TK DP-V	Walbro WT	Zama C1Q	Walbro WT
Butterfly	Slide Valve	Butterfly	Butterfly	Butterfly
No	Yes	Yes	No	No
In Crankcase	Cushion	Cushion	Bolt-On	In Crankcase
Steel / 2 / 2	Steel / 4 / 4	Bonded / 2 / 1	Bonded / 2 / 1	Steel / 3 / 1
1,380	1,760	2,270	1,876	1,620
2-pc. / 7	Solid / 8	Solid / 8	Solid / 8	2-pc. / 8
Thread/Spline	Splined	Splined	Squared	Thread/Spline
25 / .072	26 / .063	25 / .058	26 / .073	28 / .077
Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
Separate Parts	Separate Parts	Matched Set	Separate Parts	Separate Parts
Liquid Gasket	Liquid Gasket	Synthetic Gasket	Liquid Gasket	Liquid Gasket
One-Ring	Two-Ring	Two-Ring	Two-Ring	One-Ring
Caged Needle	Caged Needle	Caged Needle	Caged Needle	Caged Needle
Cast-In Key	Milled	Cast-In	Cast-In	Cast-In Key

NUMBER 7

COMPARISON GUIDE

shindaiwa

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